

8.—WESTERN AUSTRALIAN DEVONIAN CORALS IN THE WADE COLLECTION.

BY

DOROTHY HILL, M.Sc., Ph.D.

Department of Geology, University of Queensland.

(Communicated by Dr. C. Teichert.)

Read 14th March, 1939 ; Published 2nd November, 1939.

In this paper four further species from the Rough Range Series (Upper Givetian or Lower Frasnian) of the Kimberley District of Western Australia are described, and reviews are given of the Families Syringaxonidae and Metriophyllidae.

These corals were collected by Dr. A. Wade (1938, p. 96), and are now in the University of Western Australia. The table shows the localities ; the species illustrated herein are listed in heavy type, and other entries give new localities for species previously described (Hill, 1936). The fauna indicates either an Upper Givetian or a Lower Frasnian horizon, and the presence of *Alveolites* with *Thamnopora* and the apparent absence of *Favosites* and *Heliolites* make the higher horizon seem more likely.

	A408	A581	B92	B94
<i>Alveolites suborbicularis</i> Lam.				x
<i>Barrandeophyllum rubrum</i> sp. nov.	x	x		x
<i>Disphyllum virgatum</i> (Hinde)*			x	
<i>D. depressum</i> (Hinde)				
<i>Metriophyllum</i> sp.	x			
<i>Prismatophyllum brevilamellatum</i> Hill			x	
<i>Thamnopora</i> cf. <i>dubia</i> (de Blain)				

Table of Occurrences.

- A408. South-eastern entrance of Mountain Home Spring Valley, Rough Range, Kimberley District.
- A581. Napier Range, Kimberley District.
- B92. Trigonometrical Station J, Rough Range, Kimberley District.
- B94. 10 chains East of Trigonometrical Station K, Rough Range, Kimberley District.

B92 and B94 are in the massive grey limestones of the Rough Range, A408 and A581 are in red limestone below the massive grey and are thought by Dr. Wade to be near the base of the Rough Range Series.

RUGOSE CORALS.

Family SYRINGAXONIDAE.

Type Genus : SYRINGAXON Lindström, 1882, p. 20.

Diagnosis : Simple Rugose corals with the axial ends of the major septa united at the tabulate aulos, with inclined tabellae between the aulos and the outer wall ; with contratingent minor septa and without dissepiments.

Range : Silurian to Permian.

Remarks : The genera here included in the family are (1) the Silurian *Syringaxon* of Europe, recently studied by Butler (1935), (2) the Silurian *Lac-cophyllum* Simpson of America ; (3) the Silurian and Devonian *Alleynia*

*Mlle. Le Maitre (1937, p. 107) has described this species from the Givetian of France, and also referred to it a form from the Upper Devonian of India, called *Cyathophyllum* (*Thamnophyllum* sp) by Cowper Reed.

(*Nicholsonia*) Pocta (1902, p. 184) of Bohemia, these three genera probably being synonyms, as all are distinguished by dilatation; (4) the Lower Devonian *Retiophyllum* Pocta (1902, p. 180) of Bohemia and (5) the Middle Devonian *Barrandeophyllum* Pocta of Bohemia, with which *Retiophyllum* is probably synonymous; (6) *Diphyphyllum symmetricum* Frech (1886, p. 95) from the Lower Givetian of Germany, which, however, has no minor septa; (7) the Russian Upper Devonian *Laccophyllum* of Gorsky (1932, p. 8); (8) the German Lower Carboniferous *Diphyphyllum irregulare* of Kunth (1869, pl. ii, fig. 5); (9) possibly the Russian Lower Carboniferous *Permia* Stuckenberg (1895, p. 186), although some of the figures suggest the presence of dissepiments and a possible affinity with *Aulophyllum* Edwards and Haime; and finally (10) the Russian Lower Permian *Amplexocarina* Soehkina (1928), in which minor septa may or may not be developed. Of these, *Laccophyllum*, *Alleynia*, *Barrandeophyllum* and *Permia* constituted Grabau's (1928, p. 82) family Laccophyllidae; as *Laccophyllum* is in all probability synonymous with *Syringaxon*, I have given the earlier name of the genus to the family.

The Silurian and some of the Devonian forms have dilated tissue, but in the later Devonian and Carboniferous forms the plates are usually moderately thin. Many other forms with a tabulate aulos have a dissepimentarium, e.g., the Devonian *Eridophyllum* and the Carboniferous *Aulina*, and the possibility that these have arisen from the Laccophyllidae should be kept in mind.

Genus **BARRANDEOPHYLLUM** Pocta.

Barrandeophyllum Pocta, 1902, p. 190.

? *Retiophyllum* Pocta, 1902, p. 180; monotype, *Retiophyllum mirum* Pocta *id.*, pl. 108, fig. 6; F₂ (Lower Devonian) Koneprus, Bohemia.

Genotype (by monotypy): *Barrandeophyllum perplexum* Pocta, 1902, p. 192, text-figs. 9, 10, pl. 108, figs. 4, 5, 7, 13, 19; G₁ (Couvinian), Hlubočep, Bohemia.

Diagnosis: Simple Rugose corals with the axial ends of the major septa uniting at a tabulate aulos; with inclined tabulae between the aulos and the outer wall; typically with contratingent minor septa; with unthickened tissue.

Remarks: Pocta was uncertain of the arrangement of the axial ends of the septa in *Retiophyllum*, but from his figure, the genotype seems to be *Barrandeophyllum*. *B. perplexum* has contratingent minor septa; but I am here including in the genus two species which appear to be without minor septa. These are the German Lower Givetian *Diphyphyllum symmetricum* Frech and a smaller form from the Rough Range Series of Western Australia.

***Barrandeophyllum rubrum* sp. nov.**

(Plate I., figs. 1 and 2.)

Diphyphyllum sp. cf. *symmetricum* Frech; Wade, 1938, p. 96, from preliminary determination by Hill.

Holotype: A 408a, Wade Collection, University of Western Australia. Rough Range Series, south-eastern entrance of Mountain Home Spring Valley, Kimberley District, Western Australia. Upper Givetian or Lower Frasnian.

Diagnosis: *Barrandeophyllum* without minor septa, and with 18 major septa at a diameter of 6 mm.

Description: The corallum is nearly erect or curved, attaining a diameter of 8 mm. at the edge of the calice, which is there 4 mm. deep. Height is probably about 15 mm. The epitheca shows fine growth annulation and very

weak longitudinal ridges. There are 18 thin major septa at a diameter of 6 mm., each proceeding about half-way to the axis, where it meets a thin aulos, which is not always continuous, but is about half the diameter of the corallum. In the holotype one septum, possibly the counter, is slightly swollen at its axial end, but this was not observed in other specimens. The major septa are almost straight, and there are no minor septa. The tabulae in the aulos are complete, horizontal and distant, but irregularly spaced; those between the aulos and the outer wall are complete or incomplete, usually inclined from the aulos down to the outer wall; they do not correspond in position or number with the tabulae inside the aulos.

Remarks: The tissue in topotypes is uniformly thin; but in specimens from A 581, Napier Range, it is somewhat dilated. Also, these latter individuals are smaller and have fewer septa than the topotypes. The species is very close to *Barrandeophyllum symmetricum* (Frech, 1886, p. 95, pl. vii, figs. 3, 4, 5, 17-22) from the Lower Givetian Crinoid bed of Blankenheim, Germany, the only observable differences being those of size of corallum and number of septa.

Family **METRIOPHYLLIDAE.**

Type Genus: **METRIOPHYLLUM** Edwards and Haime.

Diagnosis: Rugose corals without dissepiments, in which all the major septa unite at the axis, the cardinal fossula is on the convex side of the corallum, and a false counter fossula appears; the minor septa are short and the tabulae are distant and steeply domed; the axial end of the counter septum may be swollen.

Range: Upper Couvinian to Permian.

Remarks: The genera here regarded as forming a family were previously discussed (Hill, 1938, p. 25) merely as a morphological group of Zaphrentoid corals. Although the group may be a polyphyletic one, this has not been proved, and convenience of reference is now served by regarding it as a family. Genera are the Middle Devonian *Stereolasma* Simpson (1900, p. 205) and *Lopholasma* Simpson (1900, p. 206) of America, and the Middle and Upper Devonian *Metriophyllum* of Europe and Australia; the European Lower Carboniferous *Zaphrentis omaliusi* group described by Carruthers (1908, p. 25) which may be the Russian Lower Carboniferous *Disophyllum* Tolmatchoff (1931, p. 341) and the Scottish Lower Carboniferous *Fasciculophyllum* Thomson (1883, p. 448); the Moscovian "Densiphylloid *Zaphrentis*" (Dobrolyubova, 1936, p. 101, fig. 27) from Russia; the Uralian *Lopholasma* and *Lophocarino-phyllum* Grabau (1922, 1928, p. 147) from China; and the Permian *Lopholasma* (Soschkina, 1928) from Russia and *Malonophyllum* Okulitch and Albritton (1937) from Texas, U.S.A.

Fasciculophyllum and *Malonophyllum* are distinguished by the swollen axial end of the long counter septum; and this suggests that other genera with such a feature may bear some relation to the Metriophyllidae. Such are the Lower Carboniferous *Lophophyllum* Edwards and Haime (1850, p. lxvi); the Uralian and Permian *Sinophyllum* Grabau (1928, p. 99); the Pennsylvanian and Permian *Lophophyllidium* Grabau (1928, p. 98); and the Permian *Timorphyllum* Gerth (1921, p. 69) and *Sochkineophyllum* Grabau (1928, p. 75).

Grabau (1928) has discussed most of the genera mentioned above and has given a different interpretation of family relations.

Genus **METRIOPHYLLUM** Edwards and Haime.

Metriophyllum Edwards and Haime, 1850, p. lxxix.

Lopholasma Simpson, 1900, p. 206, figs. 19–21; genotype *Streptelasma rectum* Hall, 1876, pl. 19 *partim*, *i.e.*, that called *Lopholasma carinatum* by Simpson *id.* Hamilton shales (Givetian) Western New York.

Genotype (by designation): *Metriophyllum Bouchardi* Edwards and Haime, *id.*, 1851, p. 318, pl. vii., figs. 1, 1a, b, 2, 2a = *Cyathomitratum* Michelin, 1845, p. 183, pl. xlvii., fig. 7, *non* Schlotheim, 1820. Frasnian, Ferques, near Boulogne, France.

Diagnosis: Simple Rugosa without dissepiments, in which the major septa unite at the axis, forming a false columella; the cardinal fossula is on the convex side of the corallum and a false counter fossula appears; the tabulae are incomplete, thin and distant, arranged in tall domes; the septa bear horizontal flanges usually with upturned edges.

Range: Upper Couvinian of Germany, Givetian of Germany and America, and Frasnian of France.

Remarks: *Lopholasma* is indistinguishable from *Metriophyllum*. The horizontal flanges on the sides of the septa are very prominent and in vertical section of the corallum simulate tabulae. *M. gracile* Schlüter (1884; 1889, pl. ii, figs. 5–8) from the Upper Couvinian of Gerolstein in the Eifel, is a small species 4 to 10 mm. tall and 3 to 4 mm. in diameter, with strongly ridged epitheca, and straight major septa. This form characterises the marl banks; in a dolomitic bed of the same horizon a number of specimens with a smooth epitheca and nearly twice as large are found, which Schlüter (1889, p. 20) suggested might be called *M. laeve*, if these differences should prove real and not a matter of preservation. *M. carinatum* (Simpson) from the ? Givetian (Hamilton) of Western New York, may be 40 mm. tall and 20 mm. in diameter, and its septa are crowded, up to 32 of each order, the minor being short and often contratingent. *M. bouchardi* from the Frasnian of Ferques, France, is two or three times as tall and thick as *gracile*, but has 22 to 24 septa, slightly curved. *M. battersbyi* Edwards and Haime (1853, p. 222, pl. xlix, fig. 4) from Torquay has dissepiments and is probably not *Metriophyllum*.

METRIOPHYLLUM sp.

(Plate I, fig. 3.)

Metriophyllum sp. cf. *gracile* Schlüter; Wade, 1938, p. 96, from preliminary determination by Hill.

Description: The single slightly oblique section of this form here figured was obtained from a piece of red limestone from locality A 408, South-Eastern entrance to Mountain Home Spring Valley, Rough Range, associated with *Barrandeophyllum rubrum*. No other section was possible, and no details can be given of external form, size, or longitudinal section. At a diameter of 9 mm. there are 20 major septa alternating with 20 minor septa, all being a little thickened; the major septa proceed almost to the axis, and are then in contact laterally, leaving an axial space, which is, however, occupied by stereoplasm, possibly deposited on the surface of a tabula. Each minor septa is about 1 mm. long, and leans on the major septa on its counter side (*i.e.*, it is contratingent), except for those on either side of the counter septum, which have free edges. The cut edges of the horizontal septal carinae appear as thin offset plates from the major septa. The curvature of the thin sections of tabulae indicate that these are distant and steeply domed.

Remarks : The species differs from the Upper Couvinian (and possibly Lower Givetian) *gracile*, to which it was at first compared in being much larger and in having minor septa. From the Givetian *carinatum* it differs in having fewer septa ; from the Frasnian genotype it is apparently not very different, but as I have neither sections nor good figures of *bouchardi* I cannot be sure. Having such limited material, I have not thought it advisable to give the form a name. On the whole it would appear to indicate a Givetian or a Frasnian horizon.

TABULATE CORALS.

Genus **ALVEOLITES** Lamarck.

Alveolites Lamarck, 1801, p. 375.

Genotype : *Alveolites suborbicularis* Lamarck, 1801, p. 376, Frasnian, Germany.

Range : Silurian and Devonian.

Remarks : The genus has already been discussed in this Journal (Hill, 1936, p. 33, *quo vide*).

Alveolites suborbicularis Lamarck.

(Plate I., fig. 4.)

Alveolites suborbicularis Lamarck, 1801, p. 376. Upper Devonian (Frasnian), near Düsseldorf, Germany.

Alveolites suborbicularis Lecompte, 1933, pp. 15-25 ; 1936, p. 6.

Neotype (chosen by Smith, 1933, p. 138) : One of the syntypes of *Calamopora spongites* var. *tuberosa* Goldfuss, 1828, pl. xxviii., figs. 1a-g ; Upper Devonian of Bensberg, near Cologne, in the Goldfuss Collection, Bonn University, *i.e.*, specimen figured *loc. cit.* 1a-1b.

Diagnosis : *Alveolites* whose corallites have thick or thin walls, and are semi-lunar or sub-triangular in section ; a row of coarse spines may be present on the floor of the corallites, or a number of sporadically distributed small spines.

Description of West Australian specimen B 94a: The specimen is a yellowish fragment 8 cm. x 5 cm. x 2 cm., worn by rain weathering. Grouped layers of corallites due to repeated rejuvenescence of the colony are prominent. The corallites are almost completely reclined, in somewhat undulating layers. They are sub-triangular or semi-lunar in transverse section, and are from 0.75 mm. to 1 mm. along their longest horizontal diameter, and from 0.4 to 0.75 mm. tall. A large septal spine is occasionally visible in the centre of the floor of a corallite ; smaller spines are not observed. Pores occur uniserially on the short sides of the corallites, usually at the lower angles ; they are about 0.15 mm. in diameter, and a weathered surface shows 9 in a space of 10 mm. The walls of the corallites are fairly thick over most of the sections taken, about 0.5 mm., but those of the basal layer of corallites after a rejuvenescence are much thinner. The tabulae are very thin plates transverse to the length of the corallites, very slightly sagging, about 1 mm. apart.

Remarks : Lecompte (1933) has given an excellent account of the synonymy, morphology, development and range of this species. It is widespread in the Frasnian of Belgium and France, particularly in the stage of *Rhynchonella cuboides*. In Germany and England it occurs in the Givetian and Frasnian ; in the Carnic Alps it is reported from the Couvinian and Givetian ; in America it is widely distributed. This is the first record in Australia ; the specimen is from B 94, 10 chains East of Station K, Rough Range. In the Australian form the tabulae are much more widely spaced than in the types—5 or 6 as against 12 in 5 mm.

Genus **THAMNOPORA** Steininger.

Thamnopora Steininger, 1831, p. 10; 1834, p. 334.

Genotype: *Alveolites cervicornis* de Blainville, 1830, p. 370. Middle Devonian, Eifel.

Range: Silurian, Devonian and Permian.

Remarks: The genus has already been discussed in this Journal (Hill, 1937, p. 56, *quo vide* for references, etc.).

THAMNOPORA DUBIA (de Blainville)*.

Alveolites dubia de Blainville, 1830, p. 370 (= *Calamopora polymorpha* Goldfuss, 1826, p. 75, pl. 27, fig. 5).

Favosites dubius Lecompte, 1936, p. 54, *quo vide* for discussion of synonymy.

Holotype: The specimen in the Goldfuss Collection, Bonn University, figures by Goldfuss *loc. cit.* from Bensberg, near Cologne, Germany. Frasnian.

Diagnosis: *Thamnopora* with bi- or tri-furcating cylindrical slightly flexuous branches 4 to 6 mm. across; with corallites from 1.5 to 2 mm. in diameter, opening at about 60° from the horizontal, the thickening of the walls increasing distally.

THAMNOPORA cf. **DUBIA** (de Blainville).

(Plate I., fig. 5.)

Thamnopora polyporatus (*sic*) Wade, 1938, p. 96, from preliminary determination by Hill. Rough Range Series, Kimberley, W. Aust.

Description: The specimens are in a red earthy limestone, and the corals are broken by small faults of very slight displacement. The branches vary in diameter between 12 mm. and 7 mm.; perhaps they are somewhat flattened, but this could not be clearly ascertained. They are slightly flexuous, and probably dichotomous. The calices are polyfonal, the openings about 1 mm. in diameter; the common wall between two such calical openings is about 1 mm. thick, and has a median groove corresponding to the median dark line seen in thin sections of the wall. The corallites diverge from the axis with a fairly regular curve, the obliquity being about 40° from the horizontal at the opening. In the axial portion of the transverse section, which is about half the diameter of the branch, the corallites vary in diameter between 0.5 and 0.75 mm., the common walls being about 0.15 mm. thick. At their openings the corallites are about 2 mm. in diameter from dark line to dark line, the common walls being about 1 mm. thick. The increase in thickness of the wall is gradual from the axis to the calice. Mural pores are about 0.2 mm. in diameter and about 0.6 mm. apart. Septal spines were not observed. The tabulae are fine, distant, and slightly sagging. The fibro-radiate structure of the walls and the growth lamellation at right angles to it are clearly seen.

Remarks: This West Australian specimen from B 92, Trig. Station J, Rough Range, differs from the types in that the branches are somewhat thicker, the obliquity of the corallites is less, as they open at 40° as against 60° from the horizontal, and in the slightly greater thickness attained by the walls at the calices. In these characters it resembles closely "*Favosites dubia*" of Milne Edwards and Haime, from an unknown locality, figured by Lecompte (1936, pl. x., fig. 2), but unlike this latter has no septal spines. De Blain-

*Unpublished work by Dr. Stanley Smith and Dr. W. D. Lang indicates that this species is a synonym of *Thamnopora polyforatus* (Schlotheim, 1820), but pending publication of their evidence, I refer here to the name under which the species was so well figured by Lecompte.

ville's types also have no spines. Lecompte has given admirable descriptions of de Blainville's types and of Edwards and Haime's specimens, but we do not as yet know the range of variability in the species. The types are Frasnian, and I have specimens in the Jones Collection, University of Queensland, from the Frasnian of Boussu, which resemble the Western Australian specimens in all save a slightly greater obliquity of corallite growth. "*Dubia*" has, however, been recorded from the Couvinian of Torquay.

ACKNOWLEDGMENTS.

Preliminary determinations of the corals described in this paper were made at the Sedgwick Museum, Cambridge, where the author held a Senior Studentship granted by the Royal Commissioners for the Exhibition of 1851, but the paper has been written during tenure of a Research Fellowship within the University of Queensland financed by Commonwealth funds through the Council for Scientific and Industrial Research. For the loan of material she is indebted to Dr. A. Wade, Prof. E. de C. Clarke and Miss K. Prendergast: and for facilities for study to Prof. O. T. Jones and A. G. Brighton, Esq., of the Sedgwick Museum, and to Prof. H. C. Richards of the University of Queensland. The photographs of thin sections are the work of Mr. A. Barlow of the Sedgwick Museum, and those of externals are by Mr. E. V. Robinson of the University of Queensland.

REFERENCES.

- Butler, A. J., 1935, "On the Silurian Coral *Cyathaxonia siluriensis* McCoy," *Geol. Mag. Lond.* LXXII., pp. 116-124, pl. ii.
- Carruthers, R. G., 1908, "A Revision of some Carboniferous Corals," *Ibid.* (NS, dec. 5), V., pp. 20-31, 63-74, 158-171, pls. iv.-vi.
- Dobrolyubova, T. A., 1936, "Rugosa Corals of the Middle and Upper Carboniferous and Permian of the North Ural," *Acad. Sci. U.S.S.R. Trans. Polar Comm.* Fasc. 28. 158 pp., 81 text figs. English Summ.
- Edwards, H. M., and Haime, J., 1850-1854, "A Monograph of British Fossil Corals," 1850, Introd. and Pt. 1, xxxv., 71 pp., 11 pls.; 1853, Pt. 4, pp. 211-244, pls. xlvii.-lvi., *Palaeontogr. Soc. Monogr.*
- 1851, "Monographie des Polypiers Fossiles des Terrains Palaeozoïques," *Arch. Mus. Hist. nat. Paris*, V., 502 pp., 20 pls.
- Frech, F., 1886, "Die Cyathophylliden und Zaphrentiden des deutschen Mitteldevon," *Palaeont. Abh. Dames u. Kayser* III., Heft 3, pp. 117-234 (1-120), pls. xiii.-xx. (i.-viii).
- Gerth, H., 1921, "Die Anthozoen der Dyas von Timor," pp. 67-147, pl. cxlv.-cl., being Lief. IX., No. 16 in Wanner, J., *Paläontologie von Timor*, Stuttgart.
- Goldfuss, G. A., 1826, *Petrefacta Germaniae* I., Pt. 1, pp. 1-76, pls. i.-xxv., Folio, Düsseldorf.
- Gorsky, J., 1932, "Corals from the Lower Carboniferous Beds of the Kirghiz Steppe," *Trans. geol. prospect. Serv. U.S.S.R.*, Fasc. 51, 94 pp., 5 pls., English summ.
- Grabau, A. W., 1922, 1928, "Palaeozoic Corals of China, Pt. 1, Tetrseptata," *Palaeont. sinica* (B), II.; 1922, Fasc. 1, 76 pp., 1 pl.; 1928, Fasc. 2, 175 pp., 6 pls.
- Hill, D., 1936, "Upper Devonian Corals from Western Australia," *J. R. Soc. West. Austral.*, XXII., pp. 25-39, pl. i.
- 1937, "The Permian Corals of Western Australia," *Ibid.*, XXIII., pp. 43-63, pl. i, text-figs. 1-11.
- 1938, "Euryphyllum: A new Genus of Permian Zaphrentoid Rugose Corals," *Proc. R. Soc. Qd.*, XLIX., pp. 23-28, pl. i.
- Kunth, A., 1869, "Korallen des Schlesischen Kohlenkalkes," *Z. dtsh. geol. Ges.*, XXI., pp. 183-220, pls. ii, iii.
- Lamarck, J. B., 1801, *Système des Animaux sans Vertèbres*, Paris.
- Lecompte, M., 1933, "Le Genre *Alveolites* Lamarck dans le Dévonien moyen et supérieur de l'Ardenne," *Mém. Mus. R. Hist. nat. Belg.*, No. 55, 49 pp., 4 pls.
- 1936, "Revision des Tabulés Dévoniens décrits par Goldfuss," *Ibid.*, No. 75, 111 pp., 14 pls.
- Le Maitre, D., 1937, "Etude de la Faune corallienne des Calcaires Givétiens de la Ville-De-d'Ardin (Deux-Sèvres)," *Bull. Soc. géol. France*, (5) VII., pp. 105-128, pls. vii.-x.
- Lindström, G., 1882, "Anteckningar om silurlagren på Carlsöarne," *Öfvers K. Vetens.-Akad. Förhandl.*, 1882, No. 3, pp. 5-30, pl. iv.
- Okulitch, V. J., and Albritton, C. C., 1937, "*Malonophyllum*, a new Tetracoral from the Permian of Texas," *J. Palaeont.* XI., pp. 24-25, pl. iv.
- Poeta, P., 1902, in Barrande, J., *Système Silurien du Centre de la Bohême*, VIII., Tome II., Anthozaires et Aleyonaires, 347 pp., pls. xx.-cxviii.
- Schlüter, C., 1881, "Anthozoen des rheinischen Mittel-Devon," *Abh. geol. Spezialk. Preuss. Thüring. Staat.* VIII., Heft 4, pp. 261-465 (3-207), pls. i.-xvi.
- Simpson, G. B., 1900, "Preliminary Descriptions of new Genera of Palaeozoic Rugose Corals," *Bull. N.Y. St. Mus.*, VIII., 39, pp. 199-222, 45 figs.
- Smith, S., 1933, "Sur des espèces nouvelles d'Alveolites de l'Eifelien inférieur du Nord de la France et de la Belgique," *Ann. Soc. géol. Nord.*, LVII., pp. 134-145, pls. ii.-iii.

- Soschkina, E., 1928, "The Lower Permian Corals of the western Parts of the Northern Urals," *Bull. Soc. Naturalistes Moscou* (Sect. geol.), VI. (3-4), NS XXXVI., pp. 339-393, pl. xii.
- Stuckenberg, A., 1895, "Korallen und Bryozoen der Steinkohlenablagerungen des Urals und des Timan," *Mém. Com. Géol. St.-Petersb.*, X., No. 3, 244 pp., 24 pls.
- Thomson, J., 1883, "On the Development and generic Relation of the Corals of the Carboniferous System of Scotland," *Proc. R. phil. Soc. Glasg.*, XIV., pp. 296-520, 14 pls.
- Tolmatchoff, I. P., 1924, 1931, "Faune du Calcaire carbonifère du Bassin houiller de Kousnetz," *Mater. Geol. gen. appl. Leningr.*, Livr. 25, Pt. 1, 1924, pp. 1-320, 12 pls. and map; Part 2, 1931, pp. 321-663, 11 pls.
- Wade, A., 1938, "The Geological Succession in the West Kimberley District of Western Australia," *Rept. A.N.Z.A.A.S.*, XXIII., pp. 93-96.

EXPLANATION TO PLATE.

All specimens are from the Upper Givetian of Lower Frasnian of the Kimberley District, Western Australia, and are from the Wade Collection now at the University of Western Australia.

Fig. 1.—*Barrandeophyllum rubrum* sp. nov. A 408a, holotype, South-eastern entrance to Mountain Home Spring Valley, Rough Range; a, transverse section; b, vertical section, x $1\frac{1}{2}$ diameters.

Fig. 2.—The same. A 581, Napier Range, Kimberley. Oblique section, x $1\frac{1}{2}$ diameters.

Fig. 3.—*Metriophyllum* sp. A 408b, South-eastern entrance to Mountain Home Spring Valley, Rough Range; transverse section, x $1\frac{1}{2}$ diameters.

Fig. 4.—*Alveolites suborbicularis* Lamarck. B 94, 10 chains East of Trig. Station K, Rough Range; a, external view, x $1\frac{1}{4}$ diameters; b, c, thin sections, x $1\frac{1}{2}$ diameters.

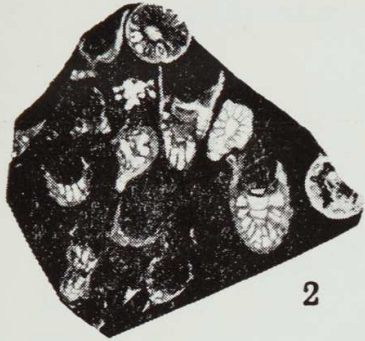
Fig. 5.—*Thamnopora* cf. *dubia* (de Blainville). B 92, Trig. Station J, Rough Range; a, external view, x $\frac{2}{3}$ diameters; b, transverse section; c, d, vertical sections, x $1\frac{1}{2}$ diameters.



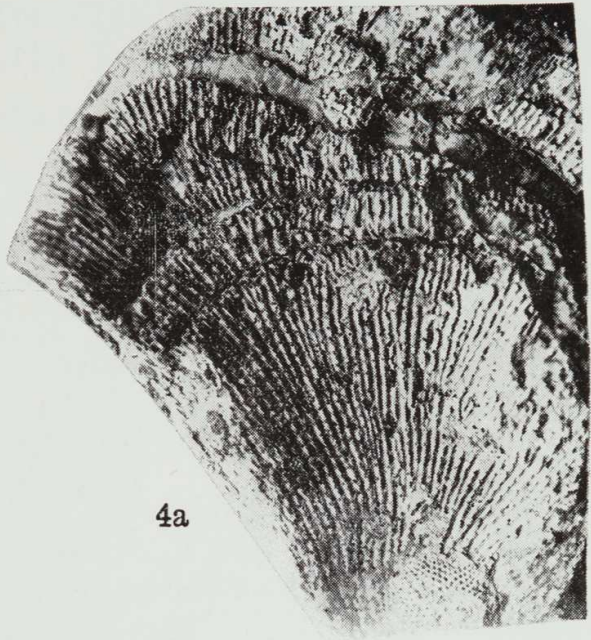
1a



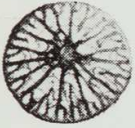
1b



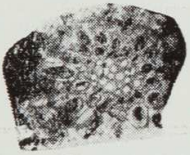
2



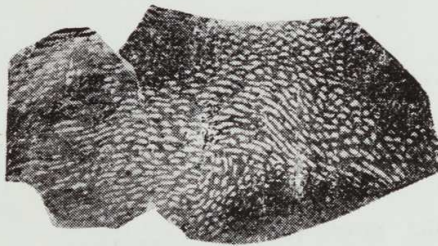
4a



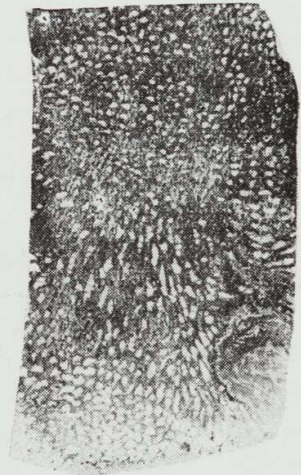
3



5b



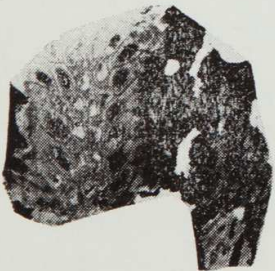
4b



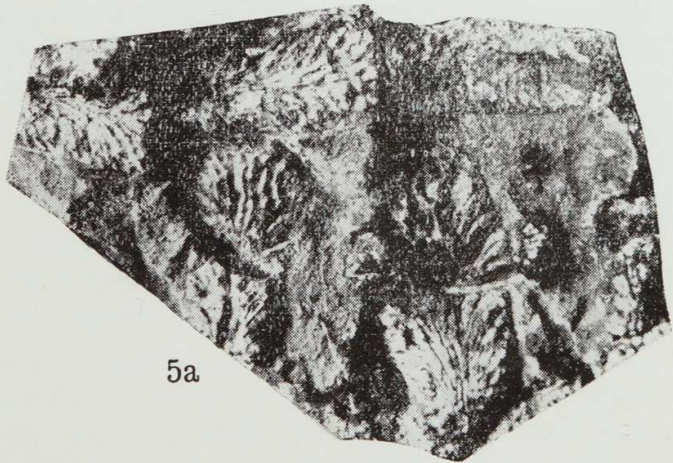
4c



5c



5d



5a